Agricultural Biofuels: Two Ethical Issues

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The science and engineering of developing biobased energy alternatives comprise known capabilities, highly plausible conjectures and problems yet to be solved. But scientists and engineers need to pay attention to the timeline implicit in this simple statement, for it suggests that we should think of biofuels in terms of a trajectory that begins in the past and arrives at some not-fully-determined point in the future. The ethics and values relevant to biofuels can be articulated through the ways in which this trajectory is represented. Backward-looking elements of the trajectory frame crucial questions about motives and intentions, while forward-looking elements frame questions about consequences and trade-offs. Statements about the past and prospects of biofuels will eventually converge in the collective imagination of the broader public. In this way, the ethics implicit in any given conceptualization of the trajectory for biofuels will play a role in forming the storyline for biofuels that helps non-specialists form opinions that will eventually play a crucial role in both marketplace and political decision making (Thompson, 2008).

It is also important to recognize that while any given statement about this trajectory can play a role in shaping the storyline that comes to dominate the thinking of the broader public, the total shape of that storyline is beyond anyone's control (Herrera, 2006; Pearce, 2007). Two ethical issues are now emerging in the storyline for biofuels. The first is the food-fuel trade-off. Rising global food prices have accompanied rising gasoline prices, and we should not be surprised that people make an association between reports about food riots in Haiti or Mexico and the thought that farmers are devoting larger and larger portions of their output to ethanol production. The second ethical issue is not currently in the headlines, but is very much on the minds of people who consider themselves to be active participants in pursuing a more sustainable future for our children. It concerns the environmental implications of the push toward biofuels.

The ethics of emerging technology, from stem cells to nuclear-power plants, is almost always situated within an attempt to make adjustments between norms and traditions that were helpful in negotiating a situation in the recent past, on the one hand, and an

uncertain future that challenges established patterns of thinking and speaking, on the other. Philosophers and social scientists who work on technology generally end with a call for more participatory conversation and discourse because it is through arguing out our differences on an uncertain future that the discovery and development of more adequate ethical responses happens. I will not offer solutions or prescriptions to these ethical issues here. Instead I will outline some alternative ways of conceptualizing and articulating the ethical dimensions of these two emerging issues.

Food vs. Fuel

Only a few months ago, political leadership at the state and federal levels in the United States was viewing biofuels primarily as a jobs program, and secondarily as a homeland-security issue. In the wake of a 6% rise in domestic food prices, well-publicized food riots and bleak projections for poor people in dozens of nations, the rhetoric has shifted. Michigan Governor Jennifer Granholm recently expressed a need to "stay away from food crops" in thinking about biofuels for the future. The ethical challenge is aptly represented by the image of wealthy Americans nonchalantly fueling gas-guzzling SUVs while hungry people in other parts of the world starve, (Brown, 2006). There is, thus, one ethical point that must be stressed at the outset: it is ethically irresponsible to promote technologies that utilize agriculture as a manufacturing system for non-food products without simultaneously and pointedly admitting that such technologies have the potential to cause severe harm to some of the world's must vulnerable people. The fact that this deprivation and harm involves food is also ethically significant above and beyond its severity. Virtually all human cultures attach some sort of special moral significance to food.

As a second point, we must recognize that "staying away from food crops" or trying to utilize plant matter not currently used for human consumption is simply not an adequate response although we currently use sizable amounts of our land base that could be used for food production for other purposes, including producing timber and fiber crops. Put bluntly, if also over simplistically, encouraging farmers to change from corn to switchgrass will also affect global food supplies. Diversions of biomass will almost certainly have impacts on soil quality that will also affect food productivity. All these impacts are tied together (Kim and Dale, 2005; Pimentel and Patzik, 2005; Hill *et al.*, 2006). A closely related point follows, though perhaps it is too obvious to need stating. Land-management decisions on whether or not to grow a food crop are not made on ethical grounds. Farmers would happily grow more food for hungry people, if growing more food is what needs to happen, but they do and will continue to base this decision based on their expected monetary returns. The ethical decisions here occur in terms of how policies and technology affect farmers' incentives. It is, thus, wholly appropriate for executive decision makers such as Governor Granholm to adjust their planning in light of the now seemingly apparent link between biofuels and hunger, even if she is mistaken in thinking that shifting away from corn ethanol is an adequate response (see also Daschle *et al.*, 2007).

But it is also important to stress that the realities of global hunger and food availability are much more complex than this initial set of ethical responses suggests. The ethical significance of hunger or food deprivation has often been analyzed as a component of human

welfare. Human welfare has, in turn, often been conceptualized through measures such as infant mortality, life expectancy and GDP. These are aggregate measurements that tell us how populations fare in response to events. They prove very useful for policy evaluation because they allow a number of comparative judgments to be made. If one can develop a proxy measure for hunger, for example, then one can analyze the food vs. fuel question through an economic-modeling exercise. Various scenarios for land use are tested to ascertain their expected impact on this proxy measure. If using land for biofuels increases hunger as reflected in a given measure of human welfare, there is an ethical problem.

Yet these measures of welfare are crude. One of the simplest is to estimate calories per person based on global, regional or national harvests, but all aggregate measures invite inferences that are subject to several well known ethical problems. First, they can easily conceal relevant distributive justice issues that may exist within the population. The global calorie measure is a particularly egregious example of this problem, because the fact that there might be enough calories produced on a global or regional basis does not reveal whether some subset of the population is getting much less than they need to survive and thrive. Second, there may be other variables such as waste and spoilage that interfere in some subset of the population's ability to obtain food. Finally, even when these problems are corrected, aggregate measures may conceal a trade-off where hunger is shifted from one sub-group to another. Such trade-offs can even seem ethically justified when they involve a reduction in the total amount of hunger, but here it may seem as if the vital interests of one person are being sacrificed as a means to secure the interests of another.

The alternative way to conceptualize the ethics of hunger is to frame the issue in terms of rights. The Universal Declaration of Human Rights includes a "right to food." Although the concept of human rights is itself somewhat controversial, this language implies that no set of political or economic circumstances can be considered morally satisfactory or legitimate unless every individual has secure access to an adequate supply of food, (Pogge, 2005; Sandøe *et al*., 2007). "Secure access" has been analyzed in terms of an entitlement that might take any of several forms. Individuals who can reliably utilize arable lands, water and adequate tools to produce food may be said to have such an entitlement. Monetary income sufficient to purchase food can also be understood as an entitlement. Both types of entitlement may be vulnerable under unusual conditions, and may require supplement in the form of institutions such as a well-established informal network of charitable relief or a state-supplemented welfare title such as the United States Department of Agriculture Food and Nutrition Service Food Stamp Program (Sen, 1981).

It is doubtful that the global food system has ever met the moral standard of adequacy implied by a right to food. At present, food entitlements in various parts of the world are vulnerable to short-term fluctuations in natural conditions, such as drought or plague, and to human-caused events such as warfare and economic forces, which, almost certainly, present far greater challenges to food entitlements. What is more, poverty leaves millions of individuals in a perennial state of insecure access to food, (Pogge, 2003). The significance of all this is that the right to food remains an aspiration, and the moral duty to achieve this aspiration takes the form of what Immanuel Kant called an "imperfect duty"—one that falls on humanity collectively, but on no person in particular. And the satisfaction

of food entitlements is notoriously difficult to monitor. In response, many contemporary analysts of hunger have urged that responsibility to secure food entitlements must be met as a condition of social justice, that is, as an ethical responsibility that must be met through institutional reform, (Pogge, 2003; 2005; Sandøe *et al.*, 2007).

How do these two ways of framing the ethics of hunger pertain to harnessing agriculture for energy or manufacturing? In short, the impact is likely to be ambiguous. Any displacement of land currently used for food production can be expected to interact with a number of other forces that will contribute to a steady increase in the price of food. Because they spend a greater share of their income on food, this will disproportionately harm the poor. Despite sophisticated economic models that disaggregate the impact of different variables, the cognitive and political availability of a shift to biofuels will almost certainly result in a widespread tendency to place moral responsibility for the consequences of rising food costs squarely on the growth of biofuels (Brown, 2006; Runge and Senauer, 2007). This is exactly what we are seeing in the press today, and it is what politicians, like my state's governor, are reacting to. But here we are taking the aggregate approach and we are talking about impacts on populations.

When we focus on food entitlements, it is important to recognize that for an estimated two-thirds of the world's poor, the bulk of their food entitlement continues to be met through direct production of food, though in many cases they depend on cash crops that are not staples or are non-food agricultural commodities, such as cotton, to generate income to purchase food. These people have been getting poorer and hungrier because they must sell some portion of their production into local commodity markets in order to meet basic needs. Competition from imported agricultural goods, the production costs of which have been subsidized by developed-world governments, is arguably the greatest threat to their effective right to food, (Mazoyer and Roudart, 2004). Harnessing arable lands for fuels might reduce this competition and strengthen their right to food. It is the remaining one third whose right to food depends upon using cash or chits to purchase food, and who are unlikely to see any benefit from rising agricultural prices, that will have their food entitlement challenged, and it is these people who are currently rioting in the streets.

Here, we see that as long as we remain limited to aggregated measures such as total calories or price data, we are in a position of addressing the food needs of one group at the expense of another. This has been the reality of hunger for decades, as agricultural specialists have blithely told the public that simple technical increases in yield would "feed the world," while in reality they have been feeding some at the cost of the livelihood for other equally poor people. Responding to this trade-off is a complex business that will almost certainly involve different strategies in different places, as well as a much, much greater willingness on the part of rich countries and rich people to provide financial assistance. It will require what Jeffery Sachs (2006) calls "clinical economics" rather than one-size-fits-all prescriptions. In short, telling overly simple stories about world hunger is ethically irresponsible. I believe there are almost certainly ways to develop biofuels and other industrial products from an agricultural base that would be compatible with addressing hunger, but I am deeply concerned by the cavalier and simple-minded approach

that scientists and business people who are pressing forward with these strategies take to the complexities of hunger. While the complexity of hunger leaves us in a deep dilemma with respect to media that seem to demand sound bites and happy endings, it is clear to me that any movement in the direction of non-food crops needs to be accompanied by a substantial commitment toward redressing the new round of challenges that poor people will face as a result.

Fuel vs. Nature

While the food-vs.-fuel question can be analyzed in fairly blunt terms, the fuel-vs.-nature question leaves us with a list of open-ended questions. It may be most useful to survey a few of these questions, and to state some reasons why they are likely to prove complex and difficult to resolve. The ethics of biofuels in this domain consists largely in a commitment to more democratic processes for addressing the political questions that must inevitably arise in connection with the fuel/nature tension.

It is important to begin by acknowledging the general presumption among biofuels scientists that this is an environmentally friendly activity. Like hunger, the rationale here is complex, and draws upon a number of scientific modeling approaches that are themselves highly contested. Two key claims are that deriving some portion of transportation fuels from biomass will help stabilize the release of carbon into the atmosphere, and that the use of perennial crops for fuel can eventually contribute to agro-ecosystems that provide more-sustainable habitat and ecosystem services than current crop agriculture (Kim and Dale, 2005). Both claims depend on a trajectory for biofuel that shifts from reliance on using existing food crops, especially maize, to a new generation of cellulosic-ethanol production. These claims and others like them may have led many to think that if the technical questions can be answered satisfactorily, then advocates of the environment will also be advocates of biofuels.

But the fuel-vs.-nature question is vexed because the agriculture-vs.-nature question is vexed. The first difficulty concerns the overarching philosophical challenge in environmental ethics, which is the question of when and whether we can develop philosophical rationales for nature preservation that transcend human-use values. The second difficulty, then, arises in evident cultural differences that come up in connection with the significance of agriculture and farming. Specifically Americans, more than any other people, tend to see nature and agriculture in diametrical opposition (Thompson, 2007). This tendency has put Americans at odds with the rest of the world on a series of agriculture and food-system issues, and biofuels may be next. But each of these difficulties must be taken in turn.

The tension between conservation and preservation has defined environmental philosophy for the last forty years. Some have argued that the ethics of the environment is exclusively a matter of ethical obligations that humans owe to one another. The ethics of land use, wilderness conservation, pollution or environmental degradation all depend on the value that human beings derive from their use of nature. There is still a need for explicit articulation of environmental ethics for two reasons. One is that people value nature for many different reasons, ranging from commodity production to ecosystem

services to aesthetic appreciation. Gaining a full grasp of these multiple values is a daunting task. The second is that our relatively recently derived ability to put the environment in danger through pollution and anthropogenic climate change means that we must articulate collective obligations to future generations, also a daunting task, (Norton, 2006).

In opposition to this view of the environment, which is sometimes referred to as anthropocentrism, there are others who argue that animals, plants and ecosystems have an intrinsic value entirely apart from the use that human beings might make of them. As such, these ecocentrists and deep ecologists argue that we owe obligations directly to non-human entities. The specific terms of the philosophical debate between anthropocentrists and ecocentrists can become quite arcane, but the relevance here is that those holding non-anthropocentric views are inveterate opponents of logging and mining. They tend to view a change in use of land or water that involves more intensive management of range, forest, wetland or prairie ecosystems as detrimental to intrinsic values associated with wild ecosystems (Rolston, 2003). They are, thus, very likely to conclude that cellulosic ethanol production will be more problematic in ethical terms than corn ethanol based on lands that are already intensively managed. It will not be enough to return forested or conserved areas to wildlife habitat in a timely fashion after harvesting biomass, because this still appears to treat an ecosystem exclusively as a means for achieving human purposes.

Although it is clear that lands currently under cultivation or managed for intensive animal production are not the primary focus of those who advocate ecocentric views, the ethics of agricultural land use has not been given a great deal of attention by those who articulate ecocentric views. Some clearly view agricultural lands as "unnatural" or as a buffer that is valuable insofar as it protects wild areas having value in themselves (Westra, 1998); others recognize that farming methods can affect wildlife habitat and ecosystem processes and tend to see agricultural lands as quasi-natural systems having some degree of the value associated with wild systems. What is more, private lands managed as infrequently harvested woodlots or for livestock grazing may be viewed as tantamount to wild systems. Outside the United States and Canada, there is a much more widespread tendency to view even highly managed agricultural ecosystems as a form of nature worthy of aesthetic appreciation and recreational activity. Although people associating such values with farmlands might be reluctant to articulate their ethic in ecocentric terms, it is clear that farms are expected to exhibit ideals of multiple use, ecological integrity and aesthetic beauty. There is, thus, a great deal of variability in what we might call the environmental ethics of agricultural lands.

One approach to understanding the ethics of agriculture is particularly significant. "Agrarianism" refers to an overlapping set of ideas that take agriculture to be of special moral significance in forming the habits and character of a people. Throughout history, agrarian ideas have emphasized the way that climate and soils tended to reinforce food-production practices that favored certain types of social and political institutions over others. Thus 19th-century figures argued that production methods conducive to self-reliant family farms were more conducive to the virtues of citizenship and patriotism needed to support a democracy, especially when compared to production systems that depended heavily on centralized management of large-scale irrigation works. Thomas Jefferson

was among those political leaders who were persuaded by agrarian ideas. The Louisiana Purchase was executed in part because Jefferson held an agrarian, rather than an industrial, vision of the American republic (Thompson, 2000; Smith, 2006).

Agrarian ideas are relevant in contemporary society primarily because they are in the process of being reformulated to emphasize a new set of overlapping themes. First, an ordinary citizen's connection to food and farming may be influential in forming habits of environmental stewardship and sustainability. Understanding one's connection to one's daily food may be a particularly effective way of connecting the often disconnected life of a city dweller or suburbanite to issues of water use, climate change and humanity's general dependence on the integrity of ecosystems. Second, a growing public interest in organic, locally produced and fairly-traded food commodities appears to be increasingly coordinated with issues that relate diet and health, on the one hand, and cultural or aesthetic food traditions, on the other. The practical implications are a rebirth of farmers' markets as well as school or community gardens and local food events, and the emergence of various direct-distribution methods that connect small and organic farmers with consumers (Thompson, 2008). Although one would sometimes be hard pressed to explain why these sometimes inconsistent ideals and practices have congealed into a growing social movement, the evidence that this is happening is now fairly strong. The emergence of this movement is a new resource for mobilizing social capital in pursuit of environmental goals. Thus, though loosely connected, new agrarian ideals represent a promising cultural trend that should be encouraged.

But what does any of this have to do with biofuels?

Indeed, that *is* the pertinent question. It is not obvious that using arable land to produce biomass for transportation fuels is contrary to any of these agrarian ideas. Indeed, it is conceivable that people could come to see their use of fuels through the lens of sustainability, providing a direct link to agrarian ideals. However, many analysts interpret all of the above themes as attaining significance as forms of resistance to the coalition of politically and economically powerful interests that currently control land use and food-system policy in the developed world. This coalition includes farm-input and grain companies, the food industry and major commodity organizations. This analysis holds that sustainability should not be understood as a set of substantive commitments to environmental or social goals, but rather as a social movement held together by the fact that food consumers, small farmers and advocates of rural community development can have influence only by resisting the power of the *status quo* coalition at every opportunity (Friedland, 2008).

The social-movement analysis of agrarian ideals involves subtlety and complexity that cannot be summarized in the present context. It is arguably the best explanation for a number of food-system controversies over the last two decades. That is, core political and market opposition to pesticides, GMOs or animal cloning would be seen as grounded in resistance to a hegemonic constellation of established interests. Because they see themselves as excluded from decision making, they feel justified in exploiting opportunities such as the alar controversy, Chernobyl, the Exxon Valdez spill, the foot and mouth outbreak in the United Kingdom, mad-cow disease and fears over genetic engineering to enroll members

of the public in their social movement. What one might call the scientific merits of the case with respect to any one of these incidents are far less important than a persistent pattern of exclusion and marginalization, at least when viewed from the perspective of a social movement organized around resistance to the *status quo*.

The relevance to biofuels is now, I hope, more apparent. To the extent that shifting land use to production of biomass for fuel production is viewed as an action undertaken by established economic and political interests, it will be a natural target for the core constituency of a social movement that defines itself in terms of resistance to those interests. Because programs for cellulosic ethanol tend to involve advanced technologies including nanotechnology and genetic engineering, it is plausible to think that this core constituency will have opportunities to mobilize broader public opinion around these already controversial initiatives. All of the above adds up to an argument for seeing the shift in land use from "nature" to "biofuels" as an issue calling for democratic debate. I will recapitulate this argument, starting with the observation that the shift to biofuels is very likely to meet resistance from some of the same people and groups who have mobilized around GMOs and opposition to industrial agriculture.

The ethics of democratic decision making requires a process that produces a legitimate decision, and that the criteria for legitimacy be established through an iterative process of dissent, debate and public discussion. Sometimes well established conventions assign decision making to the private sphere. If any given landowner decides to allocate land for biomass production, this is a decision that lies largely in the private realm, subject to limited zoning and environmental regulations. But the development of biofuels has already attracted significant investment of public funding, and the potential controversy over biofuels may well involve challenges to property rights. Local ordinances to prohibit growing GM crops provide a model for this. As such, two of the elements that call for a democratic forum are in place: a potential political contest among competing interest groups, and a set of issues that fall within the public sphere.

Two other elements have been discussed previously. First, the ethical boundary between nature and agriculture is extremely murky, and there are a number of competing perspectives that are already established in public discourse, as well as in the philosophical literature. We need a robust exchange of views on how this boundary should be understood and possibly reshaped in light of new initiatives for biofuel production. Finally, the view that certain voices have been excluded from decision making contributes to the feeling that a more strategic posture on the part of resistance movements is justified. If some perspectives or interests are systematically suppressed, then decisions cannot be the test of democratic legitimacy. In conclusion, then, there is an ethical imperative to debate the fuel-vs.-nature conflict in a democratic fashion. This debate should involve both technical and philosophical considerations.

Conclusion

The ethical issues that arise in connection with proposals to develop biofuels can be represented in terms of two oppositions: food vs. fuel and nature vs. fuel. In the case of tensions with food production, the ethical imperatives for ensuring food security are

clear, even if the means for doing so are not. However, a longstanding tendency to model food security in terms of food availability at the population level neglects the structural components of individual food entitlements. When these are taken into consideration, we see that shifting land use to production of biomass for fuels will strengthen the food entitlements of some, while weakening the entitlements of others. As such, the ethical imperative in connection with the food-vs.-fuel tension is to be vigilant in maintaining a focus on improving structural food security entitlements for all. This means, on the one hand, that a shift to biofuels is ethically acceptable on the condition that food entitlements are strengthened across the board. On the other hand, it would be ethically irresponsible to suggest that the food-vs.-fuel tension is a false one based solely on studies that model the problem at the aggregate level.

The fuel-vs.-nature tension is far less clear in terms of the multiple social and ethical goals being pursued under the aegis of nature preservation. Traditional agriculture can be seen as both inside and outside nature, given a host of contested ethical and cultural assumptions. Only a few of these ethical variables are currently well represented in technical models that attempt to assess the environmental sustainability of biomass production for transportation fuels. The track record of resistance to industrial agriculture and established interests suggests that biofuels are a likely target of opposition by individuals and groups who feel that their interests and values have not been included in decisions on agriculture, environment or rural development. As such, there should be a planned and publicly supported effort to stimulate an exchange of views on the fuel-vs.-nature boundary and on the public values appropriate for a democratically legitimate decision process in connection with biofuels development.

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